



## A. INTRODUCTION

The purpose of these Facility Standards for Design, Construction and Operations (FSDCO) is to provide guidelines to architects and engineers designing new and renovated facilities for the City of Seattle. It is intended to summarize information on what is expected by the City, either by choice or by the specialized nature of the facility, and to avoid historical problems with construction, operations and maintenance. The FSDCO includes information of a repetitive nature, more or less common to most City facilities and projects.

It is recognized that all standards indicated herein are not universally applicable to every project. Further, these standards do not replace professional design analyses. Consultants are expected to conduct independent evaluations of the requirements and to discuss with the Project Manager any difficulty in meeting these requirements.

Also, it is not intended that these standards be used directly as contract specifications. For simplicity they are devoid of the legal qualifications and language needed by contract specifications. If there are any conflicts, the Contract Agreement signed by the City and the Consultant shall take precedence.

It is further intended that these standards represent a cost-effective application of proven systems that provide sustainable (see Appendix G - Sustainable Building Policy) facilities that satisfy the City's program requirements and are efficient to operate and maintain. Suggestions for improving these standards are encouraged and should be addressed to the Project Manager.

### 1. FSDCO: Organization

Each Section of the FSDCO is dated so distribution can be monitored and revisions distributed to all current copy holders. It is imperative that the City and consultants are working with identical FSDCO revisions so as to avoid conflicts.

The FSDCO volumes include three distinct groupings of design information. The first group contains alpha-character sections which provide information and guidance regarding systems and the City's preferences or concerns; the second group contains numbered sections, following the CSI (Construction Specifications Institute) format which provide information and guidance regarding equipment, materials, installation and testing requirements; and the third group is the appendices which include detailed guide specifications where the City prefers to maintain tight control of common or unique elements found throughout most City facilities, and Standards Drawings prepared for the same reasons.

Material presented in each numerical section is intended to relate to the unique requirements of the City. As such, "Scope" will simply state the subject and content of the section. It may also contain a description of an existing City system. "Design Criteria" will address any special agenda for design reviews and submittal requirements. Requirements for codes, regulations and industry standards will then be noted, followed by general requirements (design guidelines) and specific requirements for design implementation. "Products, Materials and Equipment" will address general concerns for material choices and equipment and item types, and may also include specific manufacturer and product requirements. Lastly, "Execution" will cover both installation procedures and long range expectations for operation and maintenance requirements. It will also include any particular testing procedures and final maintenance information. In some cases there will be standard specifications (located in the appendix) for quality assurance. References will be made to applicable Standards Drawings, which will be included as Appendix SD at the end of each volume.



## **2. FSDCO: Control Procedures**

The ESD Architecture & Engineering Section is responsible for the development, maintenance, revision and distribution of the FSDCO. Periodically, the FSDCO will be updated; however, contract requirements will take precedence on all projects.

The Project Managers will manage distribution of the FSDCO to design consultants, both prime and subconsultants, to suit the specific requirements of the Consultant Agreement for each project. Consultants must work with Project Managers to assure that their project meets FSDCO requirements.

Generally, revisions involve minor "housekeeping" changes and do not significantly alter overall design and construction requirements. A brief summary of the changes will be included with each revision transmittal. FSDCO changes will be incorporated into each current project under design. It shall be the prime consultant's responsibility to advise the Project Manager, in writing, if FSDCO changes will have a major impact upon the project. Consequent nonconformance must be approved in writing by the Project Manager.

## **3. Definition of Terms**

The following are abbreviations and terms frequently used in the FSDCO text.

Consultant – A licensed registered architect or engineer or an authorized member of a licensed consulting firm or organization retained by the Owner.

Owner – The City of Seattle, acting through the Executive Services Department.

Project Manager – An individual authorized by the Executive Services Director as defined in the Agreement.

City – Executive Services Department, Facility Services Division.

ADA	Americans with Disabilities Act
CSI	Construction Specifications Institute
ESD	Executive Services Department
FSDCO	Facility Standards for Design, Construction and Operations
SBC	Seattle Building Code
SD	Standards Drawing
SEC	Seattle Electric Code Supplement
SFC	Seattle Fire Code
SFD	Seattle Fire Department

## **B. DESIGN REQUIREMENTS**

Each prime consultant has signed an Architectural Agreement (or Engineering Agreement) with the City. That agreement contains a scope of work, which may discuss the following:

### **1. Functional Program**

If not part of the scope of work, a functional program will have been prepared by the City, perhaps with the involvement of a consultant. The functional program is intended to thoroughly identify the types of spaces required, the activities and number of people to be accommodated, space sizes and proximity



relationships, services requirements, etc. The program must be well prepared to provide a good starting point for the design process. All programming for City facilities shall be based on the criteria contained in Appendix 1-A Programming Standards and Appendix 1-B Space Standards.

The programming effort shall include developing a list of Project Assumptions, setting in summary form the known and assumed facts impacting the function and design of the subject project. This list, developed and maintained by the Project Manager, will be used throughout the design process as an evolving shorthand record of the many decisions made and directions given to the consultant team.

The purpose of the initial design phase, Schematic Design, is to translate the functional program into a design concept that satisfies the functional program. A critical function of this phase is to reconcile the programmed need to the proposed design. It also serves to clarify the functional program, identify functional program oversights or excesses, and generally verify that the proposed program is feasible from a facility development perspective. By the end of the Schematic Design phase (and all subsequent phases) all functional program issues must be resolved to the owner's satisfaction. Additionally, the Consultant will provide, in tabular format, a reconciliation of the programmed space to the proposed design. Area calculations used shall be based on the standards contained in Appendix 1-A.

## **2. Codes and Ordinances**

Consultants are required to make themselves aware of all applicable codes and ordinances and assure compliance thereto. Deviations therefrom must be agreed to in writing by the Project Manager with written concurrence from the related regulatory agency. If a conflict arises between program requirements and codes and ordinances, such conflict must be resolved to the satisfaction of all interested parties prior to completion of the Design Development phase.

## **4. Record Information**

The City has facilities drawings, specifications, design computations, maintenance manuals, air balance records, etc. Consultants are expected to fully utilize these resources, in conjunction with thorough hands-on review of existing conditions, to ensure that alterations of and additions to existing facilities do not over tax existing systems to meet new requirements. The Project Manager will provide assistance as available to allow consultants to obtain all necessary information germane to the project program.

It is mandatory that consultants field-verify all reference information and purported as-built conditions since the City cannot guarantee that all conditions have remained static since last "officially" altered or documented.

The Consultant shall provide a copy of the field-verified conditions to the Project Manager.

## **5. Design Considerations**

The Consultant shall:

- a. Identify and evaluate any necessary alternates early in the design process.
- b. Provide a summary of design decisions and master specifications with editing comments.
- c. Provide a schedule for the construction sequence as part of the contract so that the Owner and the Contractor may reliably predict and schedule outages, space access and business interruptions. If there are long lead items that impact the construction schedule, they should be identified early for possible Owner purchase. Specific areas of coordination need to be identified to alert the Contractor to special work area problems.



- d. Require that all utility shutdowns be carefully coordinated with City staff as they can take several weeks of planning and all affected departments need to plan operations around them. This should be considered in the establishment of the completion date. The schedule shall be confirmed just before work begins and during construction as necessary.
- e. Provide project budget estimates at the phases and to the level required by the Agreement for Services.
- f. Provide construction schedule estimates: Evaluation of the bid market should be made. The impact of remodel work, crowded working and access spaces, parking/delivery time, and possible premium overtime hours should all be factored into the project cost estimate, and clearly stated in the construction contract.
- h. Schedule adequate time for internal review by ESD Staff, i.e., Shops, Property Management, etc., at all phases.
- i. Obtain City sign-off of all project phases, prior to commencing the subsequent phase.

## **C. GENERAL BUILDING REQUIREMENTS**

The City is saturated with buildings of all types. Even though considerable thought is given to retention of open spaces, vistas, etc., it is simply a fact that each new building added to the City becomes more difficult to site and design in relation to those which already exist so as to not negatively affect them nor be negatively affected by them. Consequently, it is becoming increasingly difficult to provide vehicular access, loading docks, waste handling facilities, outdoor air intakes, exhaust air discharges, etc., that effectively meet the needs of the facility being designed.

Many specific issues and general requirements are noted in the Facility Standards for Design, Construction and Operations (FSDCO). The comments to follow are not deviations from the intent or specifics of the aforementioned documents but are intended to emphasize various broad requirements and to focus attention on issues of major overall concern.

The ESD maintains drawings of all City facilities under the management of ESD. Drawings for other City facilities are maintained by the City Department having responsibility for that facility, or are archived at DCLU. Consultants are expected to use this resource as appropriate to develop a full understanding of existing conditions as new facilities are designed. Copies of these drawings can be requested through the Project Manager.

### **1. Serviceability**

Every building built in the City is intended to serve its purpose over a long period of years. The initial design and construction is only a brief moment in time and cost for the facility. The true value and quality of a building is measured over the years by its ability to adjust to the needs of the end-users and the cost of servicing the components and systems within the building.

A building cannot function if it cannot be serviced. Although it is important to get the "front door" right, it is the "back door" that determines how well the building will work. When building services can be provided to meet all requirements and be virtually transparent to the end users, then the building is most likely a success.

### **2. Safety and Security**

Safety and security provisions are becoming more complex as concerns for personal safety increase, equipment becomes more sophisticated and costly, and security systems of all types become more readily available at reasonable cost. More often than not, security requirements conflict directly with convenient access for maintenance, custodial care, and response to



emergencies.

Early security planning may directly influence the design and location of many strategic mechanical and electrical components to the benefit of all concerned. Standardized access and CCTV systems as required by Section 1-F General Electrical Requirements shall be provided.

The consultant shall consider crime prevention (anticipation, recognition and appraisal of crime risk and the initiation of some action to remove or reduce it) in the development of the overall design of facilities. The CPTED (Crime Prevention Through Environmental Design) Guidelines contained in Section 1 Appendix P shall be used in the design of City facilities.

In planning and designing building areas that are 80 inches or greater above surrounding floor/ground level, the designer shall make provisions for fall protection/fall restraint as required by OSHA 1910.132.

Building areas that are defined by OSHA 29 CFR 1910-146 as "Permit Required Confined Spaces" shall be minimized in the design of new or renovated City facilities.

### **3. Accessibility Provisions**

It is City policy to provide a barrier free environment that will benefit all people: the disabled for life, infants, seniors, the temporarily injured, etc. Such an environment should not be perceived as unusual or burdensome, but rather simply another aspect of our cultural fabric needing positive integration. The design teams shall design city projects so that all, including the disabled, can experience community activity. Specific Accessibility requirements are contained in Appendix J.

### **4. Structural Considerations**

It has been common practice to design to uniform building code minimum structural requirements for floor loading, seismic zone, etc. Operational experience indicates that designing to code minimums is not in the owner's long-term best interests. One example is floor load capacity. The other major consideration is vibration. A great deal of instrumentation is extremely sensitive to vibration, which leads to more rigid structures or inclusion of vibration isolation pads, etc. Designers shall address in the Schematic Design Phase; floor loading and vibration isolation provisions and advantages provided by the proposed structural system.

Floor to floor heights are an area of major concern. Although there would be some variation based on the intent of the ceiling space, anything less than fourteen feet will not be considered adequate. Further, the depth of the structure for each floor should be carefully controlled to be as uniform as possible throughout and not broken up by major beams. Although not mandatory, concrete waffle slab construction offers several advantages over most other forms of construction; e.g., no deep beams; a uniform/modular surface to work under; opportunity for patterns for hangers, sleeves, etc.; rigidity; etc., and should be given adequate consideration.

### **5. Seismic Resistance Considerations**

All consultants must include appropriate seismic provisions for all City projects. In addition to structural seismic restraint, seismic design provisions shall include bracing for furniture, equipment, or other objects, which might be dislodged, fall and either injure building occupants or disrupt emergency systems included in the facility.



It is reasonable to expect that the science and art of seismic design will continue to change rapidly as new information and faults are discovered and consultants are encouraged to anticipate and account for possible future practices and requirements as much as practicable. As a minimum, the structural design for all new City facilities shall meet the current code (UBC/SBC) seismic minimums using an importance factor of 1.25. Essential facilities, including public safety and fire facilities, shall use an importance factor of 1.5.

In renovation and remodel projects, it is not normally a requirement to upgrade existing seismic restraint systems to current code standards unless the scope of the remodel is so extensive so as to effect more than 25% of a building or appreciably change the occupancy and/or use to the facility. The upgrade of seismic systems in existing buildings is a factor of sound risk management that balances the additional cost against the additional system performance and safety. To provide the full option for risk assessment, structural systems for renovation and upgrade projects, shall be analyzed both on the basis of UBC/SBC and FEMA Standard 273. The design for subsequent retrofit or improvements shall be based on the more stringent of the two standards except where, in the opinion of the City, meeting the more stringent standard would result in severely disproportional costs for possible risk benefit.

## **6. Acoustic Control**

Articles in technical journals and field observations clearly indicate that many facilities with "heavy" ventilation and air conditioning requirements are becoming too noisy for sustained occupancy. Thus, it is mandatory that careful attention be given to thorough acoustic management of all noise sources. Because of the complexity and the problems (e.g., structural transmission) it is recommended that computerized analyses be employed when there is reason to be apprehensive about acoustic control.

## **7. Internal Accessibility**

One of the most important requirements in facilities is accessibility to services distribution systems. Pipe and duct shafts should be provided floor landings or platforms with lighting, electric outlet and doors -- not access panels. Suspended ceilings should only be provided where highly desirable in offices, conference rooms, etc. Where suspended ceilings are appropriate, they must be lift-out exposed T-bar type systems. Hidden spline type ceilings are unacceptable. Suspended ceiling material must be able to withstand a lot of handling and be easily cleaned. Where hard finish ceilings are required, extensive access panel provisions must be included, carefully sized and located to provide effective access to the equipment above.

## **8. Mechanical and Electrical Requirements**

The City's goal in the design of mechanical and electrical systems serving their facilities is to select systems and equipment that; are appropriate to the type of space served; give maximum value for their initial costs; are cost-effective to operate, maintain, and repair; provide quality indoor air; and support the sustainability policies of the City. The specifics for the selection and design of these systems are elaborated herein Paragraph E. and F. as well as in Appendixes 1-G, 1-H, 1-I, and 1-K and in Sections 3 and 4. The consultant shall review and become familiar with these requirements which shall not be violated without specific notice and approval.

If room data sheets for support spaces, e.g., mechanical and electrical rooms and closets, custodial spaces, loading docks, etc., have not been completed prior to award of the design contract, the selected consultant must begin by developing room data sheets for all support



spaces of this type, involving representatives of the Department(s) effected and the Project Manager. This work must be completed during the schematic design phase.

## **9. Interior Finishes**

The City's goal in the selection of interior finishes is to select materials that; that are appropriate to the type of space served; are free of hazardous materials; give maximum value for their initial costs; are cost-effective to clean, maintain, and repair; provide quality indoor air; and support the sustainability policies of the City. The specifics for the selection of interior finishes are detailed in Appendix 1-C. The consultant shall review and become familiar with these requirements which shall not be violated without specific notice and approval.

## **D. GENERAL BUILDING SERVICE REQUIREMENTS**

### **1. Vehicular Access**

In order to service any facility it is imperative that service vehicles have direct access to the facility. Early in the design process, the amount of service vehicle traffic to be generated by the facility must be identified and accounted for in the plan. A dedicated vehicular access for delivery and service vehicles is mandatory and should be thoughtfully integrated into the overall design philosophy for the building and the site.

It is not unusual for service, delivery or construction vehicles to access buildings in ways different than planned, therefor pedestrian pathways, plazas, etc., shall be designed for H-20 vehicular loads just the same as all streets.

#### **a.) Vehicle & Loading Access Doors**

Building interior vehicle access, some loading areas, "Sally Ports", and other building interior areas are generally accessed through large door systems. In all cases possible, such doors are to be "Overhead Panel", or "Horizontal Sliding", rather than "Overhead Coiling" door systems. Overhead Coiling doors are to be avoided at all costs. In new buildings, early design consideration is to be paid to providing sufficient overhead clearance at sufficient horizontal clearance from the door and inside the space, to allow for "Overhead Panel" doors. The doors are to have oversize, or the heaviest possible operating hardware, to provide for both operational reliability and durability.

### **2. Loading Dock/Service Area**

#### **a. General**

Loading docks, service areas, dumpster enclosures, and waste handling facilities shall meet all the requirements of Standards 10050 contained herein Section 2. Where necessary to provide for the safe and efficient transfer of large quantities or sizes of material in and out of City facilities, a loading dock should be provided. It is the consultant's responsibility to identify the extent of requirements during the schematic and design development phases of each project and then incorporate all associated provisions into the contract documents. In general, the program will dictate whether a separate service entrance with loading dock is required. If required, it is for custodial service deliveries; mail delivery and pick-up; waste collection and removal; recycling; facility maintenance; delivery services (U.P.S., Federal Express, etc.); general contractors and subcontractors; movers; etc. In some cases, there is a possibility of mail and package screening. Considerable care must be exercised in regard to minimizing conflicts with provisions for disabled persons.



**b. Service Areas**

Service areas and loading docks must be carefully located in consideration of other design features of the building and adjoining existing buildings. This area must accommodate various functions such as waste management, recycling, chemical waste, pickup and delivery. All-weather, access must be provided. Verify sizes of waste and recycling containers with the Project Manager.

**3. Waste Handling**

Effective waste management must be carefully considered at the very beginning stages of design. Some facilities may have waste that is considered to be hazardous or waste that requires special handling by designated regulatory agencies. Waste handling provisions must be carefully developed and in such a way as to not negatively affect or diminish the aesthetics or functional provisions required for site standard presentation. New buildings and remodels must comply with new space requirements for solid waste and recycling storage as established by Sections 23.47.029, 23.48.031, and 23.49.015 of the Seattle Municipal Code.

Effective recycle management provisions consisting of work space for waste management staff and retention space for segregated waste awaiting routine pickup must be included in the waste handling area of all facilities. Green Chutes shall be installed in all new buildings greater than one story in height. The chutes should be installed in pairs with one chute as a two cubic yard dumpster for commingled recycling and another dumpster for glass.

**4. Custodial Provisions**

Designers must make adequate provisions for the receipt, storage and redistribution of custodial supplies for the building and for the efficient operational servicing of the building. Custodial closets for local storage and control of supplies and equipment, in close proximity to the freight elevator, should be included on every floor. Section 10010 of Section 2 contains specific requirements for the planning and design of custodial provisions in City Facilities.

**5. Elevators, Vertical Access**

Elevators and stairways are required in every facility more than one story high to handle people, material, equipment movement among floors. Early consideration must be given to the scale and potential conflict of equipment, material and waste movement versus passenger movement.

A number of elements are available to the designer to fashion efficient vertical transportation systems. Well-designed and properly located stairways and dual-purpose freight-passenger elevators can be important elements in vertical movement of people. Dedicated freight elevators are normally required near loading docks, supply rooms, and other marshaling points for material traffic. Dumbwaiters and dual-purpose freight-passenger machines are useful complements to freight elevators and can substitute for freight elevators in special situations. However, the error of not providing adequate elevator systems is usually considered to be a huge operational penalty by the end users and is one of the most costly deficiencies to correct in later years.

Consultants shall identify the basic performance parameters of number, size, and speed of cars as part of the Basic Technical Program. Size and speed requirements will generally dictate the type, whether hydraulic, geared traction, or gearless traction. In some instances, combinations such as double-roped gearless should be considered. In general, hydraulic machines should be specified only for elevators with relatively infrequent use. Any elevator serving 4 or more floors shall be sized for use by emergency stretcher as required by UBC.





For building in which elevators and/or escalators are the primary means of vertical access, the design criteria shall be as follows:

Maximum projected wait to load, upbound peak = 30 seconds.

Maximum projected wait to load, downbound peak = 30 seconds.

Maximum projected wait to load, daytime base = 30 seconds.

## **6. Mechanical Rooms and Pipe/Duct Shafts**

Consultants shall identify an adequate amount of mechanical room space which makes allowance for efficient operation, servicing, repair, and removal of mechanical equipment as part of the Basic Technical Program. Mechanical rooms shall not be planned for any other use, specifically, they may not to be used as janitorial materials storage or rest break areas.

In addition to rooms required for HVAC equipment and distribution, a working room for mechanical equipment, having clear and easy access to the exterior, shall be provided in the basement, adjacent to the utility tunnel connection, to provide for proper management of all central mechanical utilities and their distribution within the building. Distribution within the building shall be via readily accessible pipe and duct shafts.

To the maximum extent possible, mechanical equipment shall be located in interior space. Interior mechanical rooms also must be planned with adequate sound insulation to mitigate the noise generated by mechanical equipment. It is preferred, that when rooftop equipment is necessary, that the equipment area be completely enclosed with a louvered wall and covered with a roof structure. Penetrations of the outer roof are discouraged. Use of open air "wells" should be considered at strategic locations so that exhaust ducts and plumbing vents can move horizontally under the roof, enter the wells through vertical surfaces and then turn vertically to discharge to atmosphere without penetrating the horizontal waterproof roof membrane.

## **7. Electrical Rooms and Closets**

Adequate space for electrical equipment shall be provided in the basement utility connection to provide for proper management of all central electrical utilities and their distribution within the building. Distribution within the building shall be via readily accessible electric rooms or closets. Electric rooms or closets must be independent from all other types of closets, e.g., communications, telephone, custodial, etc. Adequate ventilation for heat producing and/or heat sensitive electrical equipment must be provided -- gravity/ natural convection type wherever possible. Piping is absolutely not allowed in transformer vaults and main switchgear areas. The City must not be exposed to the risks that can result from lack of proper design attention to this requirement. Electrical -- Separate rooms shall be designated to accommodate the immediate and / or future installation of on-site co-generation of power (i.e., microturbine engines or fuel cells).

## **8. Communications**

### **a. General Considerations.**

1. The Consultant shall include an DoIT Communications engineer -- in the design of any new building to insure telecommunications requirements are considered.



2. The sizes and configurations of communications rooms in a building will depend upon several factors, chiefly:
    - a) The number of people (workstations) in the building;
    - b) The number of people (workstations) on each floor;
    - c) The nature of technology in use in the building, e.g., number of personal computers, number and kind of mid- and mainframe computers, printers, interactive-voice-response systems, applications servers and so forth.
  3. Security. In general access to all telecommunications rooms should be controlled by proximity cards rather than keys. This method allows a log of everyone who entered such rooms and allows quick and simple shutdown of access when a card is lost or an employee (City, contractor, US West or other) leaves service.
- b. Communications Rooms
1. Main Distribution Frames – usually a large room in the basement or on a lower level where fiber optic and copper cables from outside the building enter and can be cross-connected to the internal wiring plant. Considerations:
    - a) Space and power and HVAC for main building City telephone switch
    - b) Vented battery plant in a separate room from the communications room. See also OSHA requirements for such rooms.
    - c) Space and power and HVAC for main building City data communications devices (switches, routers).
    - d) UPS (uninterruptible power supplies) for most telephone and data com equipment.
    - e) Backup generator. Such a generator may be required based upon the importance of the building and the communications requirements of the building tenants. Such a generator could be located in a separate room near the MDF or in another part of the building.
    - f) Wall board – punch down block field.
  2. Intermediate Distribution Frames – a room on each floor where fiber optic and copper cables that run vertically inside the building from the MDF can be cross-connected to the floor distribution cabling. Considerations.
    - a) IDF's could be located on every floor, or, if properly designed, perhaps every third floor;
    - b) Wall board – punch down block field
    - c) Space and power and HVAC for each floors data communications switches
- c. Wiring Infrastructure Considerations (including Workstations):
1. Wiring from outside the building:
    - a) City ESD Communications requirements
    - b) Dual entrances to the building (from two separate directions)
    - c) Fiber optic cable will need to enter the building as CCTV requires fiber optic cable for real time monitoring.
    - d) Copper cable
    - e) Telecommunications companies requirements
    - f) Provision for multiple companies



- g) Cable television. Connect to CATV vendors probably via fiber optic cable to the MDF, with CATV distributed to certain floors and rooms via coaxial cable.
  - 2. Vertical wiring from MDF to IDFs on each floor:
    - a) Provide 4 empty conduits with pull line, 4" in diameter, from the MDF to each floor IDF
    - b) Later fiber optic or copper cable will be pulled inside the conduits
  - 3. Floor distribution wiring:
    - a) Four pair (eight wire) twisted pair cables to each jack
    - b) Category 6 wire
  - 4. Workstation requirements:
    - a) Four jacks in a quad-plex wall plate at each workstation
    - b) RJ45 jacks
    - c) One telephone and one data jack at each workstation, plus considerations for other devices – fax, second phone, second computer, modems, etc.
  - 5. General requirements
    - a) Plan an additional 15% quad-plexes per floor to cover fax machines, printers etc. in common work areas
    - b) Plan at least one power-fail phone per 10 workstations, including one power-fail phone in each conference room
    - c) Conference rooms
      - 1) Plan one quad-plex every six linear feet – a minimum of two per room
      - 2) Plan one telephone instrument per room
- d. Consolidated Server and Computer Room considerations
  - 1. Plan one major computer/server room for the building, located adjacent, but separate from the MDF. The separate room is for security and fire suppression.
  - 2. Additional rooms may be required on other floors depending upon user requirements.
  - 3. See considerations for UPS, battery and generator backup under item #2 above.
- e. Radio requirements
  - 1. Some facilities may require an inside antenna (e.g., "leaky coax") to insure proper 800 MHz public safety radio coverage inside the building.
  - 2. Some facilities may require BDA's to amplify or repeat outside radio signals (800 MHz or other) and rebroadcast them inside the building.
  - 3. The roofs of some facilities may be appropriate for supporting antennas for 800 MHz public safety or other radio broadcast



## **9. Teleconferencing and Video Facilities**

1. All major City facilities will have at least one conference room with interactive video equipment. This will be used for videoconferences, training and long-distance interviews. Besides security on the room, it will also need storage and wiring provision for the equipment.
2. A dedicated cable TV room shall be provided in each building required to be wired for cable TV access.

## **E. GENERAL MECHANICAL REQUIREMENTS**

### **1. Drawings and Specifications**

The drawings are intended to be only diagrammatic. The consultant shall make all provisions required by codes, regulatory agencies, and industry practices for high quality installations. Pipe sizes shown on the drawings are intended to be the minimum acceptable to the City and should be increased as design calculations may dictate. When design calculations have been completed, consultants shall verify that service requirements can be met at the City's proposed points of service connection. The consultant's documents shall be complete for this project. Reference to other drawings and specifications is not acceptable except for nationally and locally accepted industry standards and codes.

Piping and ductwork shall not be shown on the same drawings when the scale is less than one-quarter inch to the foot. Ducts that are greater than 12 inches shall be indicated at true dimensions while ducts 12 inches or less in size may be shown by a single line.

Complicated areas requiring careful coordination of trades in order to install all systems and maintain maintenance access shall be detailed with cross-section drawings at one-quarter inch to the foot or larger scale, showing all systems. Detailed plans at not less than ¼ inch per foot scale and cross-sections shall be provided for all mechanical equipment rooms to show the detailed horizontal and vertical relationship of important components. Such drawings shall indicate clearances and accessibility for routine operation, maintenance and repair. Burying apparatus requiring operation, maintenance and repair above or behind fixed piping, conduit, duct work, etc., is unacceptable.

Refer to Appendix 1E for CADD layering standards.

### **2. Sanitary Sewer and Storm Drainage**

Sanitary sewer and storm drainage systems shall be separated. Corrosive waste may require a dilution/neutralizing tank. Hazardous wastes are disposed of by a collection service. Roof drains, footing drains, and area drains shall be connected to the storm drainage system. All active and/or inactive sanitary or storm piping within the footprint of the facility shall be removed and relocated as appropriate. All systems shall be designed for gravity conveyance. Pumping of sewage or storm drainage is not permitted without specific approval of the Project Manager. For remodel projects, verify adequacy of service.



**3. Water Service**

Water service to the facility shall be provided from the adjacent central water distribution mains in accordance with the utilities drawing provided for the project. Separate services shall be provided for fire protection where utilized. For remodel projects, verify adequacy of service.

**4. Natural Gas**

Natural gas is available and shall be utilized where appropriate in mechanical spaces. For remodel projects, verify adequacy of service.

**5. Compressed Air**

Compressed air should be reduced to 30 psig before distribution within buildings. Occasionally there is a requirement for higher pressure air, which should be separately served.

**6. Plumbing**

Cross contamination control in facilities is a critical concern. Consequently, two water distribution systems shall be provided within each facility; i.e., potable and non-potable/industrial water. The non-potable/industrial system shall serve make-up water requirements for cooling systems, etc. Distribution systems must be isolated from each other and the utility service to the building by backflow prevention devices. Dual back-flow prevention devices (or equivalent piping connections) must be provided since shutdowns are impossible to arrange for routine testing and maintenance of the devices. Generous space provisions must be allowed in such areas for proper testing and maintenance.

Provide central distribution systems with circulation if hot water is heated with low-pressure steam.

For precise guidelines, consult the current edition of 'Cross Connection Control Manual - Accepted Procedure and Practice' published by the Pacific Northwest Section of AWWA.

**7. Heating**

It is preferred that the envelope heat loss be accommodated by a variable temperature, constant flow perimeter hot water heating system, properly zoned for solar variations. Other systems, V.A.V etc.) may be considered if specifically approved by the City.

**8. Cooling/Air Conditioning**

Cooling and air conditioning requirements must be reviewed with the Project Manager early-on to evaluate requirements and explore solutions so that related building impacts, e.g., cooling towers, can be properly integrated into the program and design solution.

**9. Ventilation**

Mechanical ventilation shall be provided for all spaces. Even though the exterior rooms may be provided with code-complying ventilation capacity in the fenestration (window/door design), a minimum six air change per hour ventilation rate shall be mechanically maintained to alleviate the problems of the "air-tight" building and preclude opening windows during the heating season for ventilation purposes, which becomes an uncontrolled heat loss and causes undesirable drafts.



However, mixed systems utilizing temperature controlled exhaust fans with operable windows for ventilation during hot days is recommended where feasible.

All interior ventilation shall meet occupancy-driven building code ventilation requirements, maximum internal heat-gain cooling requirements, and fume exhaust make-up air requirements. Supply air ventilation systems shall be variable volume type to assure that minimum amounts of supply air are processed at all times to assure minimum operating costs throughout the entire system. Heating and cooling energy costs are second only to custodial costs in regard to the annual cost of operating facilities. Every energy cost reduction resulting from improved design techniques is an investment in the life-long economic value of the building and should be pursued to the maximum extent within the given program and budget.

Supply air intakes and exhaust fan discharges are critical issues for the building being planned and for the buildings surrounding the site selected for the new building. Outdoor air intakes must be carefully located to avoid ingesting contaminated air from exhaust air discharges from this or other buildings, vehicles in roadways or at loading docks, etc. Similarly, exhaust air discharges from this building must be carefully located to avoid recirculation into the building and to avoid contaminating the air intakes of adjoining buildings. Experience indicates that mistakes are virtually irreversible or, at best, are exceedingly costly to correct. Air intake and discharge requirements must be resolved before almost all other design considerations due to the influence such decisions will have on all of the rest of the design.

#### **10. Temperature/Humidity Control and Energy Management**

The City's standard for temperature and energy management control is Siemens. Building temperature, humidity and energy management controls shall be direct digital control (DDC) technology utilizing distributed microprocessor based apparatus. Each building shall be designed to operate in a "stand alone" mode but shall include the necessary features for communication with a remote operator's station. Connection to a remote operator's station must be included at the time of bid and construction. The inclusion of such shall have no bearing on the environment control system to be provided.

The variable volume requirements are the most sensitive and stringent requirements for the system. Fume exhaust air quantities will vary based on current use; supply air quantities will vary to match and to accommodate cooling requirements; yet pre-determined differential air conditions must be maintained between adjoining occupancies. These requirements must be automatically sustained.

#### **11. Fire Protection**

All new City buildings, regardless of minimum code requirements, shall be provided with wet-pipe sprinkler fire protection systems throughout, except where disallowed by code or dry-pipe type is required for freeze or equipment protection reasons. All systems shall be normal-hazard or greater, as may be required by code.

#### **12. Irrigation**

All landscaping closely associated with the building shall be provided with automatic irrigation. Time-clock controls shall be located in areas with visual access to irrigated areas and remotely located automatic valves shall be located in valve boxes. Irrigation systems shall be designed using non-potable water. Plastic piping is acceptable if not less than schedule 40. Zone the system dissimilar discharge components are not mixed on the same zone.



Generally, the mechanical engineer should be responsible for the irrigation header in the mechanical room and piping within the building. The civil engineer or landscape architect shall be responsible for outside piping.

## **F. GENERAL ELECTRICAL REQUIREMENTS**

### **1. Plans and Specifications**

The City's Project Manager will work with the consultant to provide a proposed utility distribution and connection drawing. The drawings are intended to be only diagrammatic. The consultant shall make all provisions required by codes, regulatory agencies, and industry practices for high quality installations. Conduit and cable sizes shown on the drawing are intended to be the minimum acceptable to the City and should be increased as design calculations may dictate. When design calculations have been completed, consultants shall verify that service requirements can be met at the City's proposed points of service connection.

The consultant's documents shall be complete for the specific project. References to other drawings and specifications are not acceptable except for nationally and locally accepted industry standards and codes. Lighting, power and communications wiring shall not be shown on the same drawings when the scale is less than one-quarter inch to the foot.

Complicated areas requiring careful coordination of trades in order to install all systems and maintain maintenance access shall be detailed with plans and cross-section drawings at one-quarter inch to the foot or larger scale, showing all systems. Plans and cross-sections shall be provided for all electrical equipment rooms to show the horizontal and vertical relationship of important components. Such drawings shall indicate access for routine operation, maintenance and repair. Burying apparatus requiring operation, maintenance and repair above or behind fixed piping, conduit, ductwork, etc. is unacceptable.

Refer to Appendix 1E for CADD layering standards.

### **2. Primary Power**

The City has several power sources. When available, a utilities drawing will be provided for each specific project to indicate availability, preferred point of connection location, anticipated transformer size, etc. For remodel projects, verify adequacy of service.

### **3. On-Site Power Generation**

When Life Cycle Cost and Performance Model evaluations are positive, all new City facilities will accommodate immediate and or future installations of on-site, co-generation of power (i.e., microturbine engines, fuel cells, etc.)

### **4. Emergency Power**

The City has emergency power systems, which typically vary by building. Since system capacity is much more limited than the primary electric power system, City staff must specifically approve the type of system and all loads added to the emergency power system.



## **5. Power Distribution**

Anticipating future loads or special needs is difficult, however providing flexibility of power distribution within City facilities is imperative. Local distribution must be planned with generous conduit sizing, sleeving, and extra space in principal electrical cabinets or closets. Sleeving and conduit up-sizing is a modest-cost investment toward serving unknown future requirements, which can then be accommodated by the relatively inexpensive installation of increased size wiring.

## **6. Lighting**

Lighting control systems shall accommodate use by other than the normal building occupants; e.g., custodial staff, maintenance mechanics, etc., who may not be familiar with unique provisions. Hence, a convenient means for on/off control must be provided for service support staff otherwise frustrated staff who don't understand normal operation may abort sophisticated control systems.

Use of energy saving switching such as dual switching, daylight zoning, and occupancy sensors is encouraged.

## **7. Communications Systems**

The most rapidly growing and changing building utility is communications systems. Communications Facility Design data in the Facility Standards for: Design, Construction and Operations must be the primary resource for technical program requirements and related decision-making.

## **8. Fire Alarm System**

Major changes have been occurring with fire alarm systems due to (1) ADA; (2) changing requirements of the Seattle Fire Department and (3) technological advancements in equipment and systems. Fire alarm systems must meet all applicable codes and provide automatic monitoring and reporting. Rated doors on hold-open devices must fail-safe to closed position when alarm system is activated. Monitoring and security system shall be linked with the alarm system where possible. Appendix B of Section 3 and Appendix 4A of Section 4 outlines specific fire protection and alarm requirements for City facilities.

## **9. Access Control Systems**

An integrated access control and alarm monitoring system with the capability of alarm graphics, integrated badging, and CCTV monitoring, using Windows NT Operating System or the equivalent for multiple workstations is required. The system must be compatible with AMAG American Magnetics 525 Software and must be configured for multiple site codes and multi-company configuration to allow segregated management at various locations including remote site support via Dial-up chains. Efficient alarm management with status and command from maps and comprehensive reporting capabilities including scheduled reports is required. (See Section 4 for detailed requirements).

## **10. Closed Circuit Television (CCTV) Systems**

Where programmed, an integrated CCTV system as supplied by "Pelco", with digital recording, fiber optic capability, internet viewing capability, fixed color cameras, color pan tilt cameras, motion detection, and ability to interface with the AMAG access control system, panic alarms, and intrusion detection alarms shall be provided. The system must have the ability to print out clear, color CCTV photos of on-screen images. Systems will also include 21" color monitors by Pelco, Internet viewing





by Pelco, fixed color cameras by Pelco, and digital recording by Vicon. The CCTV system must be designed to handle further expansion.

## **G. DOCUMENT REQUIREMENTS**

### **1. Reference Drawings**

The City's Project Manager maintains files of drawings under two categories: (a) record drawings, and (b) design drawings, which may also include as-built information as provided by the design architect or project contractor.

#### **a. Record Drawings**

At closeout of all City projects, the following minimum record drawings shall be required:

1. Site plans
2. Utility system layouts by individual service and diagrams
3. Composite utility drawings
4. Irrigation systems

Only drawings complying with the format requirements of paragraph 2 and Appendix 1-E will be accepted as Record Drawings.

#### **b. Design Drawings**

The consultant is expected to provide adequate project design drawings for the project, complying with the layering and drawing format requirements of paragraph 2 and Appendix 1-E.

The design drawings containing, as a minimum, the following information will be used to generate record drawings:

1. All site information, including civil, mechanical, electrical, landscaping, and Irrigation
2. All architectural, structural, mechanical, plumbing, power, lighting, and signal/telecommunications plans

### **2. Drawing Requirements**

The following drawing standards apply to all project contract drawings and facility record drawings. Additional drawing format requirements are contained in Appendix 1E.

#### **a. General Requirements**

1. The size of all sheets shall be either 24" x 36" or 30"x42" as needed to most effectively communicate the project. All sheets for a given project shall be of the same size.
2. All City record drawings will be on the City standard record drawing title block. The following information shall be provided in the lower right hand corner of each sheet:

BLDG ID:  
PROJECT NO:



3. Text size shall be a minimum of 1/8", and shall be easily legible when reduced to half size. Symbols or other line work shall not crowd text. No limit has been set on maximum text size but the finished product shall be neat in appearance.
4. Symbol size shall be proportionate to the size of the drawing and must be drawn so as to be legible when the drawing is reduced to half-size. City approved abbreviations and symbols are provided in the City's general boilerplate. The Project Manager prior to implementation must approve any modifications of abbreviations or symbols in writing.
5. All plans shall be drawn to scale as follows:  
  
Site plan: 1" = 20';  
Floor plans and elevations: minimum 1/8" = 1'-0";  
Room layouts: 1/4" = 1'-0";  
Mechanical spaces, sections and details: minimum 1/4"=1'-0"; and  
Utility tunnel manholes - floor plan and sections: minimum 3/8"=1'-0".
6. North orientation for all drawings shall be consistent both within a document set and among the plans and details of all disciplines. North orientation shall generally be towards the top of the drawing and shall be specifically shown on all site and floor plan drawings and other drawings as appropriate. The preferred location for the North arrow designation is to the right of appropriate plans.
7. Sets of drawings shall be independently complete and shall include abbreviation lists, symbols, standard drawings and diagrams, and equipment schedules for each construction discipline. Including drawings in the specification or other bound documents is not acceptable.
8. All project contract drawings and specifications shall be submitted to the City's Project Manager for archiving. Plans produced for design phases prior to construction documents need not be submitted for archiving but must be submitted for plan review. Drawings submitted for archiving shall be submitted in both hard-copy and electronic format. Hard copies shall be provided at full size, on three mil, double matte, drafting film for dry, contact print reproduction and microfilming. Only black ink shall be used. Diazo sepias, sepia mylars, sticky-backs on mylar film or slicks are not acceptable for archiving. A black line photo process on double matte drafting film is acceptable but black line photo process on slick drafting film is not acceptable. Any process requiring pin bars for printing on microfilm is not acceptable.

b. CAD Drawing Requirements

A complete description of the standards for CAD files is provided in Appendix 1E.

c. One-Line Diagrams, Sequence of Operation, and Equipment Schedules

1. Consistent arrangement within the contract documents and records drawings is desirable for a variety of reasons: plan review, contractor convenience, and for the benefit of the maintenance and operations staff.
2. Of great importance to the operations staff are mechanical and electrical one-line diagrams for the many systems within the facilities, related sequence of operations,



equipment schedules indicating design requirements, and final operational set-points after balancing, testing, and commissioning have been completed. The following requirements are published and full adoption by consultants is encouraged.

3. The first sheets of drawings in the mechanical set and the electrical set should be devoted to indexes, abbreviations, symbols, line nomenclature, and site plans; followed by one-eighth inch scale floor plans of the building and various systems which are, in turn, followed by one-quarter inch scale mechanical and electrical room drawings and details. One-line diagrams and equipment schedules are worked in wherever space is available in proximity to the major plans showing the equipment, etc.
4. The City would prefer that all one-line diagrams be grouped together on one or more consecutive drawing sheets followed by consecutive drawing sheets which contain all of the equipment schedules; and that this series of drawing sheets precede the one-eighth scale floor plans. It is suggested that this requirement can be met if a decimal numbering system is utilized for these drawing sheets: e.g., M2.1, M2.2, etc., for equipment schedules; M3.1, M3.2, etc., for one-line diagrams; and so forth. The same would apply for electrical drawings.
5. One-line diagrams often require comprehensive sequence of operation discussions in order to fully indicate the operational expectations of the various systems. Consequently, it is imperative that sequence of operation discussions be included on the drawings with the diagrams so that the complete "package" can be reproduced and posted in appropriate mechanical and electrical spaces for the convenience of the operations staff.
6. The Standard Drawings (SD) appendices contain various "generic" one-line diagrams to indicate arrangements that have been adopted as City standards. Consultants are expected to reproduce, and modify as appropriate, these drawings on the contract drawings. In addition, the City has developed various "generic" equipment schedules for use by the design consultant to indicate design requirements; and the contractor, balancer, and commissioning agent to record installed equipment information and final set-point conditions. Consultants are expected to reproduce these schedules on the drawings, as appropriate.

### 3. Specifications

#### a. General

1. The specification writer should be familiar with all applicable sections of the FSDCO. Applicable information and instructions contained in the FSDCO should be included in the contract documents.
2. The specification statements should be concise: detailed to the extent that all necessary comments are included. Edit the specifications to include only those sections applicable to the scope of the project. Complete the specifications to the extent that there is no doubt as to the type and quality of all equipment and material to be furnished, and the installation of same.
3. Abbreviations may be used that are recognized as standard industry terms (and defined). Abbreviations peculiar to a manufacturer, particularly trade, or for the



convenience of the specification, shall be defined in an abbreviation list in the "general" section of the specification or included on the drawings.

4. Indicate, as applicable, which industry standards and/or codes must be complied with.
  5. If sub-division sections are to be utilized (i.e., excavations, reinforcing steel, concrete, equipment schedules, etc.), the necessary items should be covered and referenced.
  6. Equipment shall be thoroughly defined as to materials, construction, grade, class, basic components, accessories, safety features, controls, factory tests, finish, etc.
  7. Equipment ratings shall not be stated in the specification: Show this information on the drawings.
  8. With the exception of sole source products, it is desirable to list a minimum of three (3) acceptable manufacturers for equipment and materials to be provided. Manufacturer's names shall be spelled out. Avoid using initials or "industry jargon" terms.
- b. Specification Organization
1. Use the Construction Specification Institute (CSI) numbering system.
  2. Use Executive Services Department (ESD) Boilerplate (Appendix K)
  3. Each section (e.g., Elevators, Plumbing, Lighting, etc.) should consist of at least four distinct subsections: Part 1, General; Part 2, Products; Part 3, Execution; and Part 4, Testing and Commissioning. In some instances a fifth section: Part 5, Training may be necessary.
  4. Part 1, General: Include the following, as appropriate:
    - Work Included (the overall scope of this section);
    - Related Work (in other sections that directly associate with this work or influences how this work is done).
    - Quality Assurance (applicable codes, regulations, standards);
    - General Requirements (reference to general contract requirements);
    - As built (specifics referenced to general contract requirements);
    - Submittals (if more detailed and specific than already indicated in the general contract requirements);
    - O & M Manuals (if more detailed and specific than already indicated in the general contract requirements);
    - Warranty (any unique specifics).
  5. Part 2, Products: List materials and equipment components required for this section of the work. Details of manufacture or delivery to the site may be included as appropriate. This Part shall not include discussions regarding installation or workmanship or system operation other than that necessary to clearly indicate what kind of equipment or material is required.
  6. Part 3, Execution: Indicate requirements for proper installation of the equipment and materials identified in Part 2. Discussions herein do not take the place of thoroughly developed one-line diagrams, which must be shown on the drawings,



but may help to clarify various accessory installation requirements. Emphasis on workmanship and quality control is appropriate in this Part.

7. Part 4, Testing and Commissioning: Provide detailed requirements (as appropriate) for individual testing of each installed piece of equipment to assure that design and manufacturer's indicated capacities are achieved. It shall also indicate the overall commissioning requirements for the completed system of equipment and materials.
8. Part 5, Training: This may not be necessary if all that is required is nominal orientation by the contractor for the Owner's personnel after the work is complete. This would be referred to in the Execution part. Occasionally, extensive training is required, including sending Owner's personnel to manufacturer's training facilities. When such is the case, this should be included to clearly indicate Owner's expectations, both in regard to remote training and local system training. Final training cannot be completed until all systems have been commissioned and are certified to be operating correctly.

c. Permits and Certificates

1. The City will pay for the General Building Permit. All other permits are the responsibility of the contractor.
2. The consultant and Project Manager shall be responsible for determining the "authority having jurisdiction" and applicable code for the contractor's use in obtaining permits and inspections.
3. Indicate required permits and inspections in accordance with applicable local codes and regulations. City of Seattle regulations shall govern, and, in addition, elevators are also governed by state code.
4. Certificate of occupancy shall be obtained and shall be submitted to the Owner at the completion of the work.

d. Equipment Approval

All electrical equipment shall be listed or labeled per NEC 110-2. Before the City may accept any unlisted equipment, the contractor shall have inspection and testing performed by an approved testing laboratory and accepted by the authority having jurisdiction. An exception may be made if the equipment does not have a listing and where approved by the authority having jurisdiction.

e. Operations and Maintenance Training

1. The specifications shall include requirements for the contractor to provide detailed training and instruction for City personnel. It shall be a requirement that the contractor videotape all training sessions and a copy provided to the City prior to final completion.
2. The instruction or training periods shall not commence until the systems involved are complete, tested, and operating, and O & M manuals and as-builts completed.



3. The contractor shall be required to have qualified individuals conducting all training. As a minimum, training personnel shall be foremen or superintendents from the trade involved, or a factory representative for special equipment or systems.
- f. Equipment Maintenance Manuals
1. The Mechanical and Electrical contractors shall be required to prepare maintenance manuals for the servicing of all equipment installed as a part of their division. The general contractor shall prepare maintenance manuals for equipment in other divisions.
  2. The information contained in the manuals shall be grouped in an orderly arrangement under basic categories; i.e., Primary Distribution Equipment, Secondary Systems Equipment, Special Raceways, Motors & Controls, Lighting Equipment, Clock & Program Equipment, Fire & Security Alarm Equipment, Central Supervisory Equipment, Special Communication Systems, etc.
  3. The manuals shall have typewritten index and divider sheets between categories with identifying tabs.
  4. Data incorporated into manuals shall be neat, clean copies, 8-1/2" x 11" size for binding.
  5. The information included must be the exact equipment installed, not the complete "line" of the manufacturer. Where sheets show the equipment installed, as well as other equipment, the installed equipment shall be neatly and clearly identified on such sheets.
  6. Manuals shall contain shop drawings, wiring diagrams, operating and maintenance instructions, replacement parts list, equipment nameplate data and performance curves or Tables for all equipment and systems installed under the project. All control systems shall be fully described along with operation descriptions and all system interfaces.
  7. Wiring diagrams for each system shall be complete drawings for the specific system installed under the contract. "Typical" diagrams will not be acceptable unless properly marked to indicate the exact field installations.
  8. The completed manuals shall be contained in slant ring view binders (3 "D" rings) with clear vinyl overlay on the front cover and spine. The binders shall have heavy-duty nylon reinforced hinges. The front cover "slip sheet" shall include: City, project name & number, building name, date, architect, appropriate engineer (mechanical, electrical, whatever), and reference to specific contents (e.g., Mechanical Operations and Maintenance Manual, Electrical Operations and Maintenance Manual, Warranties and Bonds, Furnishings, whatever). The spine "slip sheet", shall include: City, building name, and project name and number, and year.
  9. The General Contractor shall coordinate volumes from all trades into a distinctive set; with complete uniformity of color, format, cover "slip sheets", indexing, tabbing, etc. The final volumes shall have a very professional quality and appearance.



10. One preliminary copy of all volumes, including covers and "slip sheets", shall be submitted to the Project Manager for review and approval.
  11. Three complete copies of all volumes shall be delivered to the Owner upon approval of the preliminary copy, before systems turnover to the Owner and/or Owner training. The completed manuals shall be utilized during the training and commissioning process to verify the contents and assist with both processes.
- g. Utility Services for Construction
1. It is essential that construction utility services availability be addressed in the contract documents. For City construction, the consultant shall discuss with Seattle Public Utilities what sources and options are available to the contractor; describe what SPU will provide in the way of connection, metering, transformers, etc. Payment responsibility for hookup charges and energy use prior to project completion shall be clearly identified.
  2. The Consultant shall show the layout for utilities connection on the drawings.

#### **H. DESIGN/DOCUMENT REVIEW REQUIREMENTS**

##### **1. Progress Reviews**

The Architectural (or Engineering) Agreement identifies the specific requirements for documents to be submitted to the Project Manager for review at the conclusion of the three basic design stages; (1) Schematic, (2) Design Development, and (3) Construction Document. It is imperative that these requirements be met in order to assure timely and thorough review and compliance with the project schedule.

Design subconsultants shall be included as integral members of the project team in the early stages of design. Due to the increasing intensity of technical requirements in buildings of all types, it is mandatory that each technical field be fully represented in the early stages of design to assure that adequate provisions are included in the floor plans.

##### **2. Informal Reviews**

In addition to the formal progress review periods it is important that many less formal reviews occur. It is imperative that thorough communication and understanding exist between City staff and consultants to assure that the owner's needs are understood and accommodated and that each new facility be designed with maintenance and operation requirements fully recognized. These considerations are best dealt with via a series of on-the-board reviews with the consultants in their offices to consider design options and make decisions while design latitudes are still flexible. The more review and concurrence that can be achieved mid-phase the easier and less intrusive will be the end-of-phase comments.



3. Quality Control Review

National statistics have shown that 80% of documents errors and omissions occur in only 20% of the items on a given set of documents and this 20% tend to be repeated with each project. Of these errors and omissions, over 50% are directly related to interdisciplinary coordination issues. The design consultant shall implement a document quality control plan to minimize the impact of poor coordinated documents.

In the case of major projects, a formal Document Quality Control (QC) Review may be required by the City to assist the consultant in realizing quality contract documents. This review is not intended to relieve the consultant of their responsibility for producing complete and integrated documents. Based on a the Multi-Check™ team review methodology, the QC Review is a three-step process of check, correct, and backcheck. The QC team will use detailed discipline-based checklists, color coded annotation, and narrative comments to identify conflicts, errors, and or omissions from, and between the various elements of the bid documents. The Design Team will respond to all QC checks and comments, resolving interferences and conflicting design while expanding and completing gaps and omissions in the documents. As a final the QC team leader will backcheck the corrected documents to verify that corrections were made.

4. Other Reviews

In addition to the document reviews noted above, sustainability review, ADA review, constructability review, design commission, and historical review may be necessary.

**End of Section 1**